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Proceedings of the PSARC Habitat Subcommittee Meeting September 11, 2003

Compte rendu de la réunion du Sous-comité sur l'habitat du CEESP tenue le 11 septembre 2003

September 11, 2003
Nanaimo, B.C.

B. Antcliffe
Habitat Subcommittee Chair

Fisheries and Oceans Canada
Pacific Scientific Advice Review Committee
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PACIFIC SCIENTIFIC ADVICE REVIEW COMMITTEE (PSARC)
HABITAT SUBCOMMITTEE MEETING

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SUMMARY

Three working papers were reviewed at the Pacific Scientific Advice Review Committee (PSARC) Habitat Subcommittee meeting on September 11, 2003 at the Pacific Biological Station, Nanaimo, BC. Topics covered by these papers included a literature review of northern BC oil and gas, a proposed central coast integrated management plan area boundary, and a framework for a benthic aquaculture monitoring program.

The first paper entitled "State of knowledge of marine ecosystems of the northern BC coast in oil and gas lease area" was accepted subject to revision. A key conclusion of the Subcommittee was that there are data gaps in biological knowledge of the oil and gas lease area, including ecosystem characterization, spatial distribution of many marine species (e.g., corals, and other non-commercial species), temporal variability, dynamic models, and local/traditional ecological knowledge. A collaborative, inter-agency Delphic process was recommended as a next step to review existing databases, identify data gaps and usability, and set research priorities. The Subcommittee also requested advice from RMEC on how to address external reviewer's comments that Local/Traditional Ecological Knowledge for the oil and gas lease area be incorporated into data sets.

The second paper entitled "Proposed central coast integrated management plan area boundary" was declared a work-in-progress on the basis that revisions are required and further review by the Subcommittee is necessary to discuss the revisions and formulate Subcommittee conclusions and recommendations to RMEC.

The final paper presented a "Framework for a benthic aquaculture monitoring program in Pacific Region". This paper was accepted subject to revisions, including the formulation of recommendations by the author. The author should meet with Habitat Management staff who requested this advice to formulate more specific advice pertaining to regulatory monitoring and to provide justification on which variables or components are to be recommended. The Subcommittee concluded that the revised version of this paper does not need to be reviewed again by the Habitat Subcommittee.

The Subcommittee also made an overall recommendation that referees (external reviewers) of PSARC papers should receive the questions being asked by the Habitat or Oceans Managers which are documented in the Working Paper Request. Currently, the external reviewers are provided with the following six questions to guide their review: Is the purpose of the working paper clearly stated; Are the data and methods adequate to support the conclusions; Are the data and methods explained in sufficient detail to properly evaluate the conclusions; Are the recommendations provided in a form useful to a habitat manager; Does the advice reflect the uncertainty in the data, analysis, or process; and, What additional areas of research are needed to improve the assessment abilities. Since the reviewers do not receive a copy of the working paper request, they are unaware of the specific advice

requested from Habitat and Oceans Managers, and the key questions that Science was asked to addressed. The peer review process could be improved by providing a copy of the working paper request to all reviewers.

SOMMAIRE

Trois documents de travail ont été examinés lors de la réunion du Sous-comité sur l'habitat du Comité d'examen des évaluations scientifiques du Pacifique (CEESP) tenue le 11 septembre 2003 à la Station biologique du Pacifique, à Nanaimo (C.-B.). Ces documents traitaient d'une analyse d'articles sur les ressources pétrolières et gazières du Nord de la C.-B., d'une délimitation proposée d'une région aux fins d'un plan de gestion intégrée au centre de la côte et d'un cadre de programme de surveillance de l'aquaculture benthique.

Le premier document, relatif aux connaissances sur les organismes marins dans les concessions pétrolières et gazières le long de la côte dans le Nord de la C.-B. (*State of Knowledge of marine organisms of the northern BC coast in oil and gas lease area*), a été accepté sous réserve de la révision. Le Sous-comité a principalement conclu que les connaissances biologiques sur les concessions pétrolières et gazières ne sont pas appuyées par suffisamment de données, notamment en ce qui concerne la caractérisation des écosystèmes, la répartition géographique de nombreuses espèces marines (comme les coraux et d'autres espèces non commerciales), la variabilité temporelle, les modèles dynamiques et les connaissances locales et traditionnelles en écologie. Il est recommandé comme étape suivante de suivre un processus Delphic inter-organisationnel collectif pour examiner les bases de données, repérer les lacunes quant aux données et à la convivialité et fixer les priorités de la recherche. Le Sous-comité a également demandé des conseils au Comité exécutif de la gestion des ressources sur la façon de tenir compte des commentaires des réviseurs externes, selon lesquels les connaissances locales et traditionnelles en écologie relatives aux concessions pétrolières et gazières doivent être ajoutées à des ensembles de données.

Le deuxième document, relatif à une délimitation proposée d'une région aux fins d'un plan de gestion intégrée au centre de la côte (*Proposed central coast integrated management plan area boundary*), a été considéré comme un travail en cours, puisque des révisions doivent être faites et qu'il est nécessaire que le Sous-comité l'examine de nouveau pour discuter des révisions et formuler des conclusions et des recommandations à l'intention du Comité exécutif de la gestion des ressources.

Quant au document final, il présentait un cadre de programme de surveillance de l'aquaculture benthique dans la région du Pacifique (*Framework for a benthic aquaculture monitoring program in Pacific Region*). Il a été accepté sous réserve des révisions, notamment de la formulation de recommandations par l'auteur. Celui-ci devrait rencontrer le personnel de la Gestion de l'habitat, qui a demandé cet avis pour formuler des conseils plus précis sur la surveillance de la réglementation et pour

justifier les variables ou éléments qui seront recommandés. Le Sous-comité n'a pas jugé nécessaire d'examiner de nouveau la version révisée de ce document.

Le Sous-comité a aussi recommandé de façon générale que les réviseurs externes des documents du CEESP reçoivent les questions posées par les gestionnaires de l'Habitat et des Océans qui sont consignées dans la demande de document de travail. Actuellement, les réviseurs externes reçoivent les six questions suivantes, qui orientent leur révision : Le but du document de travail est-il clairement défini? Les données et les méthodes suffisent-elles pour appuyer les conclusions? Les données et les méthodes sont-elles suffisamment détaillées pour évaluer les conclusions comme il se doit? La forme dans laquelle les recommandations sont formulées est-elle utile aux gestionnaires de l'habitat? L'avis reflète-il l'incertitude des données, des analyses ou du processus? Quels autres domaines de recherche doivent être pris en compte pour améliorer les capacités d'évaluation? Étant donné que les réviseurs ne reçoivent pas de copie de la demande du document de travail, ils ne sont pas au courant des avis précis que les gestionnaires des Océans et de l'Habitat demandent ni des principales questions sur lesquelles on demande aux Sciences de se pencher. Le processus d'examen par les pairs pourrait être amélioré en fournissant une copie de la demande du document de travail à tous les réviseurs.

INTRODUCTION

The PSARC Habitat Subcommittee met September 11, 2003 at the Pacific Biological Station in Nanaimo, British Columbia. The Subcommittee Chair, B. Antcliffe, opened the meeting by welcoming the participants. During the introductory remarks, the objectives of the meeting were reviewed, along with the protocol to be observed by external participants and observers. The Subcommittee accepted the meeting agenda.

The Subcommittee reviewed three Working Papers. Summaries of each are in Appendix 1. The meeting agenda appears as Appendix 2. A list of meeting participants, observers and reviewers is included as Appendix 3.

DETAILED COMMENTS FROM THE REVIEW

H2003-01: State of knowledge of marine ecosystems of the northern BC coast in oil and gas lease areas

G. Jamieson and H. Davies

The Subcommittee felt that the Working Paper introduction should note that the original PSARC paper on offshore oil and gas (titled "Knowledge Gaps and Risks of Concern for BC Marine Environments from Offshore Oil and Gas Exploration, Development, Production, Transportation and Decommissioning") presented at the

March 2002 PSARC Habitat Subcommittee meeting was not published, as the Resource Management Executive Committee (RMEC) decided that it was scoped too broadly for one paper. The original paper was thus broken down into six shorter, more focused papers as follows:

1. Oceanographic and Geological Setting of a Possible Oil and Gas Industry in the Queen Charlotte Basin
2. Biogeochemical Benchmarks for Source Identification of Contaminants from an Offshore Oil and Gas Industry
3. Modeling Oceanic Fates of Contaminants from the Offshore Oil and Gas Industry with Application to British Columbia
4. State of Knowledge of Marine Ecosystems of the Northern BC Coast
5. Potential Hazards and Impacts of an Offshore Oil and Gas Industry in the Queen Charlotte Basin
6. Role of Modeling in Ecological Risk Assessment and Ecological Risk Management with Emphasis on the Offshore Oil and Gas Industry

At the previous Habitat PSARC meeting in December, 2002, Working Papers #1, 2, 3, and 6 were reviewed and accepted by the Subcommittee. This paper is #4 in the series, and the final paper (#5) has not been prepared. A full evaluation of all 6 papers upon their completion has been recommended, however, it is not certain at this time whether this evaluation would be the subject of a 7th PSARC paper.

Two external reviewers felt that the purpose of the paper was clear; however, one reviewer suggested clarifying the intent of the paper, which was to describe the level of knowledge currently available on the habitat of the north coast of BC so that potential environmental effects of oil and gas development can be knowledgably addressed. The author commented that issues pertaining to biological impacts of oil (including the science panel recommendations and review comments pertaining to inclusion of the Exxon Valdez incident) were beyond the scope of this paper. Limited discussion on impacts of oil spills was included only for context and as an overview. The Subcommittee agreed that information pertaining to impacts (e.g., vulnerability to oil) should be removed, and the focus should be our state of knowledge of marine ecosystems, primarily Fisheries and Oceans Canada (DFO) databases and some others.

The Subcommittee discussed whether the original question of "whether existing data and databases are sufficient to achieve satisfactory protection of the BC marine environment exposed to potential offshore oil and gas activities and development" is adequately addressed by the current paper. The author clarified that it was not the intent of this paper to do a risk assessment of potential impacts, which is the focus of the final paper not yet prepared. The author and the Subcommittee felt that information on the potential hazard and impacts of offshore oil and gas activities, and the information needs of habitat managers is required to answer the question of whether existing data and databases are sufficient. However, the Subcommittee

concluded that there were important data gaps that needed to be addressed (see conclusions below).

Research data gaps were discussed. They included information pertaining to non-commercial species, broader ecosystem structure and function (as opposed to information on single species), and spatial and temporal distribution of species. The timeframe and resources available for preparation of this paper prevented spatial extent of various species' abundances to be documented. Earlier identified research gaps need to be updated (re: current status and relevancy). It was emphasized that there is a need to further assess and develop a process for identifying data gaps and what information/data are needed by managers.

The key recommendation of the authors was that, because we are in a situation where we cannot address all data and databases as there are many and they are dynamic, we need to establish a collaborate inter-agency process as a next step to review existing databases and identify data gaps. The author recommended the Delphic (expert) review process, and this was supported by the Subcommittee. It was also suggested that this process examine the utility of the existing data for use in decision-making, as some of it may be outdated or of poor quality, and that this process include consideration of the need to assess and map sensitive areas to perturbations, and the need for broader ecosystem characterization of the area(s). There was emphasis from external reviewers that this type of review needs to be a collaborative approach among all agencies.

The issue of DFO's failure to evaluate and adopt any marine habitat classification system was discussed as an issue for clarification. The author noted that there will probably be a workshop next spring to discuss DFO marine habitat classification needs; however, classification systems were not within the scope of the current PSARC paper. The author indicated that since DFO has not yet made a decision regarding a classification system, he did not want to support or discuss in detail any particular eco-system classification system in the paper. The Subcommittee requested that this be clarified in the paper, lest it will be seen that those systems that are referred to in the paper are seen as being supported by the authors.

Although it was discussed above that the focus of the paper should be our state of knowledge of marine ecosystems (as opposed to impacts), a participant questioned the use of the term "ecosystem" in the paper title as it is a term that we really do not understand and our state of the knowledge of ecosystems is limited. They also noted that the paper is a compilation of information on "organisms" not the ecosystem. The Subcommittee concurred that use of "ecosystem" may not be appropriate since "ecosystem" does imply species interaction. The author and Subcommittee agreed to change the title to "organisms" instead of "ecosystem".

The authors agreed with one reviewer's comments that there is need for a long-term data base and a transparent process for DFO to store, process and make data accessible to the public. The authors supported this, but remarked that this needs to

be well thought out before embarking on such an initiative, and this was not within the scope of the present paper. Although it was suggested that we consult with non-government organizations and others on their databases, the authors did not have time to do this; however, many of their databases are based on government data, so they are likely to have been included.

One reviewer commented that the authors did not have sufficient time to meet and obtain input from a large group of experts. The authors agreed that would be desirable, and that there is a need to obtain input from the managers who want and need the information.

It was emphasized by the authors that traditional/local ecological knowledge (LEK) is very important but it is not generally available, and has not been broadly collected and compiled. All participants, including First Nations representatives, agreed that LEK is an important component. The authors will add a recommendation regarding the need to include LEK data in future considerations. Discussion focused on the expertise required to address LEK, and it was noted that there are two University of Northern BC contracts that will be dealing with LEK for this study area. The Subcommittee felt that they did not really know how to address this issue within PSARC. It was suggested that the Subcommittee recommend that RMEC provide advice on how to deal with this issue.

Subcommittee Conclusions

The paper was accepted subject to revision.

The Subcommittee concluded that there are data gaps in biological knowledge of the oil and gas lease area, including ecosystem characterization, spatial distribution of many marine species (e.g., corals and other non-commercial species), temporal variability, dynamic models, and local/traditional ecological knowledge.

Subcommittee Recommendations

The Subcommittee recommended that a collaborative, inter-agency Delphic process be established as a next step to review existing databases, identify data gaps and usability, and set research priorities.

The Subcommittee recommended that RMEC provide advice on how to address external reviewer's comments that Local/Traditional Ecological Knowledge for the oil and gas lease area be incorporated into data sets.

H2003-02: Proposed central coast integrated management plan area boundary

D. Johannessen, D. Haggarty and J. Pringle

Reviewers were concerned about splitting the two sponge reefs that span both the North and Central Coast areas, and the Subcommittee expressed concern that the separation of the northern sponge reef appeared to be very arbitrary, as opposed to scientific. The author explained that both sponge reefs were not included in the LOMA (Large Ocean Management Area) because this would require a long narrow strip up Hecate Strait to Dixon Entrance, effectively dividing Hecate Strait up the middle which didn't seem scientifically defensible. The author also noted that it would be difficult to include all sponge reefs within the area boundaries, and that each reef is reasonably self-contained (they are not believed to be interconnected and rockfish show high site fidelity), with the northern reefs being separated by a significant distance from the southern ones. Thus, it was deemed to be more appropriate to separate the two northerly reefs from the three to the south. The northern boundary uses a bathymetry line as a best approximation of the northern edge of Moresby Trough (and thus the edge of Rockfish habitat) for now until more information on ecosystems and benthic substrate is available.

It was asked whether the landward boundary coincided with other political boundaries (e.g., Coastal Land Use management boundaries). The author clarified that the landward boundary was based on watersheds. It was a fortunate coincidence that other planning systems used that boundary (the authors did not blindly copy another system). It was also suggested that there should be some discussion in the paper as to whether the scale of the LOMA is appropriate.

Reviewers commented on why groundfish were used to delineate boundaries and whether this was because only groundfish data were available. The author commented that it was because groundfish data were available, but also that the different groups of groundfish were associated with different habitats (especially by substrate type). Thus, the use of groundfish to define the boundary is a proxy for differences in habitats on either side of the boundary.

The reviewers noted that the authors should more closely consider the impacts of the Central/North Coast boundary on the North coast and any future LOMA in that region. The author remarked that this is a management decision and not a scientific one.

One reviewer questioned why the methods for the British Columbia Marine Ecosystem Classification (BC MEC) system were not included. The author responded that they were in the BC MEC references. However, the author clarified that the boundary is not solely based on the BC MEC system as the author deviated from this system for the majority of the boundary.

The recently published Australian approach is thought to have used robust criteria with a rigid framework for decision making (based on substrate, oceanography, among others). This approach also classified boundaries as interim in order to reflect the ongoing nature and evolution of boundary revision in LOMA. The Australian approach should be referenced in this paper.

It was noted that the purpose of the paper was to define scientifically defensible boundaries, however, in the end, the proposed boundary did not differ much from the existing interim boundary. It was argued that there is already a boundary in place and we do not at this time have the scientific data to modify it. The author acknowledged that we currently do not have the science to set the boundary based on a single set of criteria for the entire Central Coast Area. They tried to develop the best possible boundary for the Central Coast LOMA based on existing information, and it might be appropriate to call it a modified management boundary based on science.

It was noted that, although the thoughts and processes in the paper are useful, DFO requires a strong science-based process using pre-defined scientific criteria for identification of LOMA boundaries, and the paper did not use one pre-defined set of scientific criteria to determine the boundaries. A national workshop is planned to develop criteria for defining ecoregions in Canadian marine waters, and this national process might supercede this paper. The Subcommittee discussed this issue and decided that the national process should not, in and of itself, be reason to reject the paper, and the paper would provide useful information for that process. However, the lack of scientific rigor could be reason to reject the paper or deem it a work in progress. The author noted that the ecoregions defined by the national process may not be useable as a management area boundary in the Central Coast Area and would thus not provide the advice requested by Oceans.

Several Subcommittee members felt that the authors did not use a pre-defined set of scientific criteria in setting the proposed Central Coast Integrated Management area (CCIM) boundary, and that the boundaries were drawn very subjectively. For example, it was noted that the authors used different criteria in different places without justification (e.g., current and substrate were used in the south, base of slope in the west, bathymetry and rockfish distributions in the north, and watershed boundaries in the east), and the paper contained a mixture of science and management or political boundaries, rather than just science. The author noted that the political boundaries referred to in the paper were used to highlight where the CCIM Area coincided with existing boundaries, however, the boundary itself was defined based on scientific information only. Although bathymetry was used as a criterion, no map was included and decisions were deemed arbitrary or subjective (e.g., why was the 200 m iso-bath used rather than other depths? What would happen to the boundary if 195 m or 205m was selected?) Criteria should be consistent throughout rather than arbitrary or subjective at different boundaries. It was therefore argued that the paper was not scientifically rigorous and it was

suggested that the paper should be considered a work in progress. At a minimum, it was felt that the criteria used needed to be better defined (e.g., review of criteria used and the scientific rigor of each criteria) and that maps of substrate and bathymetry were required.

Others felt that it was acceptable to use different criteria in different places as there is no single system which can be used to define boundaries for such a large and diverse area, and scientific data are currently lacking to set boundaries. They also noted that what is appropriate in one area may not be in another area. They felt that the paper could stand with revisions, and that the Subcommittee should only conclude the paper to be a work-in-progress if the scope of the paper was to be changed. No Oceans staff were present to determine whether the paper met the working paper request.

The authors agreed to some extent with comments that the criteria used to select the boundaries were not based on one single set of scientific criteria. However, they commented that it is currently not possible due to the lack of scientific information or criteria available to set such boundaries. Further, in such a large and diverse area, it may not be possible, even with more data, to define LOMA boundaries based on a single set of criteria applied equally in all areas.

The Subcommittee decided that substantial revisions were required to provide scientific rigour, and that the Working Paper should be declared a work-in-progress as the Subcommittee would like to review it again following revision in order to be able to formulate conclusions and recommendations to RMEC. This would also provide an opportunity for the authors to work with Oceans staff to ensure that the Working Paper request was addressed.

The Subcommittee discussed what revisions were required and whether the scope of the present paper should be changed. It was noted that the authors were only tasked with tweaking the existing boundaries; they were not asked to start from the beginning and define a totally new ecosystem-based boundary for the Central Coast. Nor were they asked to define ecosystems or create a system for defining ecosystems. It was suggested that it would be useful to revise the paper to describe the criteria/process used by BC MEC to develop their existing ecosystem boundaries (e.g. literature review of existing methods and analysis of classification system). It was noted that this would provide useful information to the National process; however, it would be a complete change in scope. It was decided that the authors should work with the Oceans staff who requested the paper to clarify scope and required revisions.

Subcommittee Conclusions

The paper was declared a work-in-progress on the basis that revisions are required and no Oceans staff were present to ensure that the paper addressed the Working

Paper request. Further review by the Subcommittee at the next meeting is necessary to formulate Subcommittee conclusions and recommendations to RMEC.

Subcommittee Recommendations

N/A

H2003-03: Framework for a benthic aquaculture monitoring program in the Pacific Region

T. Sutherland

Participants felt the author did a great job of reviewing all possible types of monitoring programs and variables applicable for aquaculture finfish farm sites in a decision tree format. However, it was noted that the paper did not discuss which variables are relevant for regulatory monitoring, as opposed to research. One reviewer felt that the paper format was not particularly useful to habitat managers, who still have to decide what they will monitor. Some participants argued that additional dialogue between habitat managers and the authors is required to select which components are crucial for regulatory monitoring.

One reviewer noted the paper does not separate methods which are still in the research development phase, such as multi-beam acoustic monitoring for defining benthic habitats and hotspots of organic enrichment in depositional sediments, from routine monitoring methods. The author stated the groundtruthing techniques for multi-beam surveys are more advanced than the reviewer suggested, as indicated in the presentation outlining recent work within the Pacific Region. In addition, multibeam provides a real-time image of the seafloor that can be used to steer a benthic monitoring program whose methodologies would be directly dependent on the patchy nature of the benthic environment within the Pacific Region. Multibeam surveys can be shown to be a powerful tool as well as cost-effective in the long term (e.g., by optimizing other aspects of the monitoring program).

In response to the recommendation from an external reviewer that sediment profile imaging must be included, the author commented that sediment profile imaging can be added. However, discussions should occur regarding whether the inclusion of this technique would enhance the detection of ecological change beyond what sulphide coring is capable of within soft-bottom environments or whether emphasis should be placed on the investment of funding towards the development of techniques for detecting ecological change within hard-bottom environments. The author also noted that the deep-water version of the sediment profile imaging method used on the east coast would require sufficient resources to be deployed in remote areas on the west coast.

The presentation by the author included a list of short-term and long-term monitoring requirements where the short-term program looks reasonable for a starting point for habitat staff. The short-term monitoring program is similar to that in other regions and locally, and it differs from the long-term research program that science is working on. The long-term inclusive program is geared towards detecting ecological change over a finer spatial scale over a larger area. This type of program is conducive for addressing far-field cumulative impacts. Participants still wanted to see transparency in why certain variables or methods or sampling designs were recommended or chosen over others, and why we should start with a certain program. The author noted that clarification on what is short-term versus long-term research could be addressed; however, it is not as clear, as the reviewers suggest. The author advised the PSARC paper should be prefaced with the limitations of short-term monitoring programs. For example, the short-term program is biased towards the detection of impact in soft-sediment environments and is not capable of providing an early warning of a potential HADD[1] since background levels of impact triggers (sulphides) have not been established for the Pacific Region. Finally, monitoring programs that are limited to transects of dominant organic enrichment gradients do not address potential impacts to all existing habitats.

The author felt that we cannot scale-back below the suggested short-term program. The author was seeking clarification on the user groups and the level of training required for the requested monitoring program. It should be noted the provincial government emphasized and supported the fact that a minimum amount of training is required to ensure quality control for such a monitoring program. They used the pulp and paper industry as an example of a monitoring program where the process is assigned to designated consultants with a certain level of training.

Subcommittee members noted the draft paper did not contain any recommendations, and that papers usually provide recommendations for use by habitat managers. Others noted that the recommendation of the author is the framework itself. Some questioned whether the framework provides enough detail and advice for habitat management staff to design monitoring programs for individual finfish farm sites. Habitat is looking for a reproducible framework for given depths and substrates types. However, what is missing is an extremely good site characterization (e.g., is multi-beam required and if so where?) and explanation of what key variables are recommended and why. The limitations of the various methods should also be provided. There was further discussion about whether the paper should identify a core suite of parameters as the cookie-cutter template, or whether the paper should just provide the platform for doing this.

It was noted that the measurement of a HADD is difficult because there is no operational definition of a HADD. Habitat staff clarified the HADD term was not included in the Working Paper Request questions to ensure provision of science advice with respect to benthic impacts at fish farm sites. The author noted the term

[1] (the harmful alteration, disruption or destruction of fish habitat, which is prohibited under subsection 35(1) of the *Fisheries Act*)

HADD exists in the objectives/goals (goal 2) as well as the context of the request. The purpose of the request was to seek advice on how to monitor the benthic impacts. The next stage would be for Habitat Managers to determine their comfort zone or threshold levels in terms of benthic impacts.

Although the presentation was very good and detailed, the paper did not contain the same level of information or review of the short and long-term monitoring programs. Revisions, including the development of recommendations, are required. It suggested the author meet with the Habitat Management staff who requested this working paper to discuss revisions.

Comments were provided by provincial government representatives. They noted guidance is needed to decide how to modify monitoring programs in the field based on the success or failure of planned measurements and methodologies. They noted that there appears to be some merit in pursuing tracers, and that the author did not consider nutrients as a tracer; this is used in New Zealand to identify wastes from fish farms versus logging or other sources. The author stated that nitrogen isotopes and zinc were suggested as a tracer. Regarding monitoring of hard bottom sediments, the author did not mention the use of artificial substrates (research project simulating deposition on various substrate types). They questioned whether a catalogue of key indicator species could be developed to avoid the need to identify all organisms in a sample and expressed interest in the recommendation regarding the use of meiofauna. Finally, they raised the issue of HADDs, and why it was taking DFO so long to describe what a HADD is; why not simply define it as a statistical difference between an impacted and reference site. Habitat staff responded by describing that a HADD is determined on a case-by-case basis, usually within a legal setting.

Subcommittee Conclusions

The Subcommittee accepted the paper subject to revisions, including the formulation of recommendations by the author. The author should meet with Habitat Management staff who requested this advice to formulate more specific advice pertaining to regulatory monitoring and to provide justification on which variables or components are to be recommended. The Subcommittee concluded the revised version of this paper does not need to be reviewed again by the Habitat subcommittee.

Subcommittee Recommendations

No recommendations

APPENDIX 1: Working Paper Summaries

H2003-01: State of knowledge of marine ecosystems of the northern BC coast in oil and gas lease areas

G. Jamieson and H. Davies

This Working Paper is part of a series of papers addressing marine issues, and reviews the knowledge and knowledge gaps of marine ecosystems within the Queen Charlotte oil and gas assessment area in British Columbia, Canada. We identify what is known about the principal marine habitats, biota, general trophic structure, and fisheries in the study area.

Habitat types within the study area vary in depth, substrate, relief, currents and exposure; range from nearshore to open ocean; and from sheltered inlets to high exposure sites. Habitat types that have been identified in the study area, and that could be potentially impacted by oil and gas development and associated accidents in the assessment area during development and exploitation, support a variety of potentially sensitive, valuable and complex communities including estuaries and salt marshes, intertidal mussel beds, kelp and eelgrass beds in the intertidal and shallow subtidal, and hexactinellid sponge and coral communities in deep water habitats.

We summarize biological community structure in the following habitats and species groupings:

- the intertidal (sheltered soft-substrate, sheltered hard-substrate, exposed soft-substrate and exposed hard-substrate),
- soft-bottom estuarine habitats,
- benthic subtidal habitats (sheltered, shallow (<30 m), sandy substrates; exposed, shallow (<30 m), rocky habitats; deep (30-100+ m), soft-bottom habitats; very deep (>100 m), soft-bottom troughs; deep (>20 m), rocky subtidal habitats; and very deep (>200 m), soft to mixed-substrate habitats along the Continental Slope),
- pelagic communities (phytoplankton, zooplankton, herring, salmon, and other pelagic fishes),
- marine mammals, and
- marine birds and shorebirds.

We briefly summarize species at risk and trophic structure analyses. We then provide an overview of the fisheries in the assessment area: First Nation and commercial (groundfish, other finfish and invertebrates), and conclude with a discussion on the relevance of both local ecological knowledge and of spatial information, and our knowledge on the general vulnerability of marine communities to oil.

H2003-02: Proposed central coast integrated management plan area boundary

D. Johannessen, D. Haggarty and J. Pringle

The Department of Fisheries and Oceans (DFO) is currently defining Large Ocean Management Areas (LOMAs) with the goal of developing Integrated Management Plans for these Areas. This process is based on Oceans Act policy which calls upon DFO to lead and facilitate a National Ocean Strategy. The Pacific Region Science Branch was asked by the Central Coast Integrated Management (CCIM) Working Group to prepare a scientifically defensible boundary for the first Pacific LOMA and the Central Coast Integrated Management Area.

Globally, there has been a move towards defining marine management areas based on ecosystem principles, rather than being guided by economic, social, or management principles. Over the last 30 years, Canada has been developing systems for defining and delineating marine ecosystems based on scientific knowledge. The most recent system in British Columbia was undertaken by the former Land Use Coordination Office (LUCO) of BC (now various divisions of the Ministry of Sustainable Resource Management). Although there are limitations to this classification system, it is the most complete coast-wide system that uses scientific information to define ecosystem boundaries. For this reason it was used both to define the broad marine area to be covered by the CCIM Plan, and to define detailed portions of the boundary wherever other scientific data were lacking. However, in many places the marine boundary was modified based on additional, area-specific information. This includes modifying the northern boundary with Hecate Strait, developing a new definition of the base of the continental slope, including a portion of the West Coast of Vancouver Island down to Brooks Peninsula, and excluding Bute and Toba Inlets. The landward boundary was defined using 'height of land' watershed principles. The proposed boundary is based on currently available knowledge and data. Modifications may be required as the CCIM process defines, and fills, data gaps.

H2003-03: Framework for a benthic aquaculture monitoring program in the Pacific Region

T. Sutherland

Benthic monitoring programs designed to detect environmental change require the following aspects to be defined: 1) spatial boundaries and temporal fluctuations of impact zone; 2) reference zones for each impacted substrate or habitat type; 3) cause and magnitude of environmental change; and 4) future predictions of impact trends.

In order to define the spatial extent of an impact zone, comparisons of before and after conditions and/or control and impact conditions should be considered. It is important that baseline data in support of "before" conditions be collected in regions that will receive impact, while data characterizing "control" conditions be collected in regions that will remain uninfluenced by far-field benthic impacts. In order to identify "control" or reference areas, one must have a working knowledge of the hydrography, substrate, bathymetry, and habitat characteristics of the impact site in order to provide a proper comparison of the control and impact environments. The selection of the appropriate physical, chemical, and biological parameters to be incorporated into a monitoring program will largely influence the capability to detect environmental change. Properties to be measured should include 1) tracers of waste material (i.e. Zinc), 2) altered chemical and physical parameters resulting from waste input (i.e. Sulphides/Redox), and 3) biological responses to the direct waste inputs and indirect byproducts. Further research providing practical examples of data that compares spatial and temporal variance at reference/impacted sites within the Pacific Region is required in order to create a hierarchical ranking of monitoring parameters according to their ability to detect ecological impact.

APPENDIX 2: PSARC Habitat Subcommittee Meeting Agenda September 11, 2003

AGENDA
PSARC HABITAT SUBCOMMITTEE

September 11, 2003

PBS – Seminar Room

September 11, 2003 **Start time: 09:00**

1. Introductions and PSARC meeting procedures

2. Review agenda

3. Review of WP# H2003-01: State of Knowledge of Marine Ecosystems of the Northern BC Coast in Oil and Gas Lease Areas. Jamieson and Davies

4. Review of WP# H2003-02: A Science-based Boundary for the Central Coast Integrated Management Area. Johannessen et al.

   Noon (Lunch Break)

5. Review of WP# H2003-03: Design of Monitoring Programs for Finfish Aquaculture.
   Sutherland et al.

6. Sub-Committee Review of Recommendations and Final Report

7. Next meeting – Spring 2004

APPENDIX 3. List of Attendees

Subcommittee Chair: Bonnie Antcliffe
PSARC Chair: Alan Cass

DFO Participants	**Thurs.**	
* Subcommittee Members		
Antcliffe, B.*	X	
Barry, K.	X - pm	
Farrell, M.	X	
Foreman, M.*	X	
Hume, J.*	X	
Jamieson, G.*	X	
Knapp, W.	X	
MacDonald, Bruce	X	
Levings, C. *	X	
Nener, J.	X - pm	
Quigley, J.*	X	
Non-DFO:		**Affiliation**
Dalby, J.	X - pm	Ministry of Water, Land & Air Protection
McGreer, E.	X - pm	Ministry of Water, Land & Air Protection
Robinson, C. *	X	Parks Canada
Taekema, B.	X - pm	
External Participants:		
Osborne, J.	X	Nuu Chah Nulth Tribal Council

Reviewers for the PSARC papers presented at this meeting are listed below, in alphabetical order. Their assistance is invaluable in making the PSARC process work.

Bain, H.	DFO, Ottawa
Bauer, B.	DFO, Port Hardy
Bright, D.	UMA Engineering
Gueret, D.	DFO, Prince Rupert
Hargrave, B.	DFO, Dartmouth
Patterson, M.	World Wildlife Fund
Sloan, N.	Gwaii Haanas National Reserve
Wildish, D.	DFO, St. Andrews